Fig. 6 shows that the inflow and outflows segments (10 and 11) are tubular-shaped, and their diameters may be set up according to the desired application to the sensor. The diameters are to be chosen according to standardized values.

The sensor has a low resistance to gas flow due to the low loss of energy caused by the flexible plate.

The sensor is used especially to measure the respiratory flow.

The invention may be developed in other ways without drifting away from its fundamental characteristics.

The creation described is considered to be only illustrative and not restrictive. Therefore, the scope of the invention is prescribed more based on the following claims than based on the above description. Any change or variation regarding secondary details on what is intended to be conveyed in the claims is comprised within their scope.

CLAIMS

Claim 1

A variable obstruction method to obtain a linear ratio between the differential pressure and gas volumetric flow, which consists in using a rectangular section elbow and a flexible plate located on the symmetry cross section of the elbow.

Claim 2

According to claim 1, the method involves a flexible plate at a rest state matching the symmetry cross section of the elbow.

Claim 3

According to claim 1, the method involves a flexible plate fixed on one of its edges to the elbow's distal curb.

Claim 4

According to claim 2, the useful range of the linear ratio is obtained by combining the elbow angle and the rigidity of the plate according to the application required.

Claim 5

A volumetric flow sensor for medical applications with the following characteristics.

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- A symmetric duct with regard to its cross section, with two consecutive elbows and two aligned tubular inflow and outflow segments, and capable of measuring the flow in both directions with similar results.

- A flexible rectangular plate fixed on one of its edges to the intermediate elbow's distal curb, and matches the symmetry cross section of the sensor at rest.

Claim 6

A flow sensor according to claim 5; the angles of the three consecutive elbows are 45°, 90° and 45°, respectively.

Claim 7

The flow sensor according to claim 5, in which the internal section of the elbows is rectangular.

Claim 8

In the flow sensor according to claim 5, the amplitude of the vibration of the plate-free edge during the passing of the flow is 0.5 mm when the sensor is at the upper limit of the measurement range.

Claim 9

In the flow sensor according to claim 5, the spigots are located on the outer elbows and are parallel to each other.

Claim 10

In the flow sensor according to claim 5, the orifices used by the transducer to measure the differential pressure and the plate fixed edge are on the same side of the rectangular section of the duct.

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SUMMARY OF THE INVENTION

A method to linearly measure the flow of a gas in ducts, and a gas flow sensor using such method have been developed.

In order to obtain a linear ratio between the differential pressure and the volumetric flow of a gas, a rectangular section elbow and a rectangular flexible plate located inside the elbow are used. When the flow goes through the duct, linearization is obtained by combining the resistance of the duct and a variable - area obstruction caused by the plate. With linearization, it is possible to expand the measurement range of the gas flow in one duct.

The sensor developed is used especially for the measurement of respiratory flow in medical applications. This sensor has a symmetric structure with regard to a cross section and is formed by three elbows, two tubular segments, a

flexible plate and two spigots. The outer elbows have a 45° angle and the middle elbow has a 90° angle.

The rectangular flexible plate made of polyethylene is inserted in the distal curb of the 90° elbow, and matches the sensor's symmetrical plane at rest.

The two tubular segments are colinear and joined to the 45° angle elbow. The two spigots are located in these elbows and are positioned on the same side as the fixed edge of the plate. They are used to place a pressure transducer to take the differential pressure signals.

The sensor measures the volumetric flow in both directions and the results are approximately the same. This is due to the fact that the plate has freedom of movement in both directions and the sensor is symmetric with regard to its cross section.

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ADVANTAGES OF THE FLOW SENSOR WHICH IS BEING PATENTED

1. The two-direction flow sensor has a rectangular plate located in the middle of the sensor in a transversal position, which is deflected as the gas flow goes through, originating a variable obstruction based on the flow. This plate deflection is characterized by a low mechanical vibration, which allows more accurate measurements.

2. The ratio between the differential pressure and the flow is linear, which allows measuring a wide range of flow, without requiring any electronic conditioning. This linear ratio is the result of the interaction of the effects of the variable obstruction caused by the plate and the resistance to the flow passing through the elbow-shaped duct.

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